

WHAT IS CLAIMED AS NEW AND DESIRED TO BE SECURED BY LETTERS
PATENT OF THE UNITED STATES IS:

1. A method for forming metallization and contact structures in an integrated circuit comprising:

5 a) etching a trench dielectric layer of a composite structure comprising in sequential order:

i) a semiconductor substrate comprising an active region, a gate structure thereover, and dielectric spacers adjacent to said gate structure;

ii) a contact dielectric layer; and

10 iii) a trench dielectric layer;

to form a trench in said trench dielectric layer under etch conditions which do not substantially etch said contact dielectric layer;

b) etching said contact dielectric layer under conditions which do not substantially damage said gate structure to form a first contact opening that exposes a region of said semiconductor substrate and a portion of at least one of said dielectric spacers; and

c) depositing a conductive material into said contact opening and said trench.

2. The method of claim 1, further comprising forming a second contact opening in said trench dielectric layer corresponding to said first contact opening.

20 3. The method of claim 2, wherein during etching said contact dielectric layer, said composite structure comprises a dielectric contact opening mask.

4. The method of claim 2, wherein during etching said contact dielectric layer, said composite structure further comprises a photoresist material.

5. The method of claim 2, wherein said trench dielectric layer has a thickness at least 100 Å greater than that of said trench.

25 6. The method of claim 1, wherein etching said contact dielectric layer is conducted under conditions providing an etch rate of at least 5:1 relative to that of said gate structure.

7. The method of claim 1, further comprising forming a liner, wetting and/or barrier layer in said first contact opening and said trench.

30 8. The method of claim 7, wherein said liner, wetting and/or barrier layer has a thickness of from 50 Å to 1000 Å.

9. The method of claim 1, wherein said liner, wetting and/or barrier layer comprises a material selected from the group consisting of titanium, zirconium, hafnium, tantalum, chromium, molybdenum, tungsten, copper, nickel, cobalt, ruthenium, rhodium, palladium, osmium, iridium, platinum, gold, silver, titanium-tungsten, tantalum nitride and titanium nitride.

10. The method of claim 1, wherein said conductive material is selected from the group consisting of tungsten, aluminum, copper and alloys of one of said metals.

11. The method of claim 1, further comprising removing said conductive material until its uppermost surface is substantially coplanar with an uppermost surface of said trench dielectric layer.

12. The method of claim 11, further comprising depositing an interlayer dielectric layer over said coplanar conductive material and said trench dielectric layer.

13. The method of claim 1, wherein said composite structure further comprises an anti-reflective coating disposed between said trench dielectric layer and said patterned photoresist.

14. The method of claim 13, wherein said anti-reflective coating comprises an organic anti-reflective coating.

15. The method of claim 13, wherein said anti-reflective coating comprises a dielectric anti-reflective coating.

16. The method of claim 1, wherein said trench dielectric layer comprises an undoped silicate glass layer.

17. The method of claim 1, wherein said contact dielectric layer comprises a doped silicate glass.

18. The method of claim 17, wherein said doped silicon oxide contact dielectric layer comprises a member selected from the group consisting of a phosphosilicate glass, a borophosphosilicate glass and a fluorosilicate glass.